Sun StorEdge network FC switch-8 and switch-16 Troubleshooting Guide

Switch 2.0/2.1

Please
Recycle

Adobe PostScript™

Contents

Preface

The *Sun StorEdge network FC switch-8 and switch-16 Troubleshooting Guide* describes how to diagnose and troubleshoot the Sun StorEdge network FC switch-8 and switch-16 hardware. It provides information and pointers to additional documentation you may need for installing, configuring, and using the configuration. The book is primarily intended for use by experienced system support engineers who already have a good understanding of the product.

Using UNIX Commands

This document may not contain information on basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices.

See one or more of the following for this information:

- *Solaris Handbook for Sun Peripherals*
- AnswerBook2™ online documentation for the Solaris™ operating environment
- Other software documentation that you received with your system

Typographic Conventions

Typeface	Meaning	Examples
AaBbCc123	The names of commands, files, and directories; on-screen computer output	Edit your .login file. Use ls -a to list all files. % You have mail.
AaBbCc123	What you type, when contrasted with on-screen computer output	% **su** Password:
AaBbCc123	Book titles, new words or terms, words to be emphasized	Read Chapter 6 in the *User's Guide*. These are called *class* options. You *must* be superuser to do this.
	Command-line variable; replace with a real name or value	To delete a file, type rm *filename*.

Shell Prompts

Shell	Prompt
C shell	*machine_name*%
C shell superuser	*machine_name*#
Bourne shell and Korn shell	$
Bourne shell and Korn shell superuser	#

Related Documentation

Application	Title	Part Number
Installer's information	*Sun StorEdge network FC switch-8 and switch-16 Installation, and Configuration Guide*	806-6922-10
Installer/User's information	*SANbox-8/16 Segmented Loop Switch Management and User's Manual*	875-3060-10 Rev.X
GUI and User	*Sun SANbox 16 Segmented Loop Switch User's Manual*	875-3059-10 Rev.X
switch-16	*TBD*	
Late news	*Sun StorEdge network FC switch-8 and switch-16 Release Notes*	806-6924-10
Software	*CD*	724-7491-01
T3 Installation, Operations, and Service	*Sun StorEdge T3 Disk Tray Installations, Operations and Service Manual*	806-1062-11
T3 Administration	*Sun StorEdge T3 Disk Tray Administrator's Guide*	806-1063-11
A5x00 installation and service	*Sun StorEdge A5000 Installation and Service Guide*	802-7573-16
A5x00 configuration information	*Sun StorEdge A5000 Configueation Guide*	802-0264-15
RAID software	*RAID Manager 6.22 User's Guide*	806-0478-10

Accessing Sun Documentation Online

The `docs.sun.com`^{sm} web site enables you to access select Sun technical documentation on the Web. You can browse the `docs.sun.com` archive or search for a specific book title or subject at:

    http://docs.sun.com

Ordering Sun Documentation

Fatbrain.com, an Internet professional bookstore, stocks select product documentation from Sun Microsystems, Inc.

For a list of documents and how to order them, visit the Sun Documentation Center on Fatbrain.com at:

```
http://www.fatbrain.com/documentation/sun
```

Sun Welcomes Your Comments

Sun is interested in improving its documentation and welcomes your comments and suggestions. You can email your comments to Sun at:

```
docfeedback@sun.com
```

Please include the part number (806-6923-10) of your document in the subject line of your email.

Troubleshooting for the Sun StorEdge network FC switch-8 and switch -16 Switch

Introduction

This manual is intended for administrators who encounter trouble in setting up their configurations. Often wrong physical connections, a bad GBIC, a bad switch configuration, or incorrect usage of the software causes the problem.

This document contains information and procedures for correcting faults in initial configuration, subsequent faults, and error messages.

Additional information and resources are available at http://www.sun.com/service/support/sunsolve/index.html.
The website contains information on software versions, and provides necessary patches for customers.

Supported Configurations

Note – Be sure that all systems are running Solaris 8 and that the necessary patches for switch support are installed. See http://www.sun.com/service/support/sunsolve/index.html for more information.

Sun StorEdge network FC switch-8 and Sun StorEdge network FC switch-16 Configuration

The StoreEdge FC switch can be configured into multiple zones. Each zone forms an arbitrated loop. Each zone is isolated form other zones on the same switch. Sun supports one or two hosts and up to four devices per zone (see FIGURE 1 to FIGURE 9).

Each zone must have at least two ports and may have up to the number of ports on the switch. For example, the 8-port switch may have four zones; the 16-port switch may have eight zones. Typical zone configurations are sized for the number of hosts and devices to be connected. The number of devices supported per zone depends on the device type. Unconfigured ports default to the orphan zone and may be added to an active zone later as needed. For more information see the *Sanbox 8/16 Segmented Loop Switch Management User's Manual,* packaged with your switch.

Sun supports the Sun StorEdge network FC switch-8 switch rack-mounted with up to two hosts and up to four Sun StorEdge A3500 FC arrays. Different adapter ports on a host can be connected to different loops. This allows a host to participate on multiple loops. For more information on loop configurations, refer to the *Sun StorEdge network FC switch-8 and switch-16 Installation and Configuration Guide* and to the *Sanbox 8/16 Segmented Loop Switch Management User's Manual,* shipped with your switch.

Note – Each zone may contain only one array type.

For more information on zoning, refer to the *Sun StorEdge network FC switch-8 and switch-16 Installation and Configuration Guide* and the *SANbox 8/16 Segmented Loop Switch Management User's Manual*, shipped with your system.

Note – No more than one adapter port from any given host should be connected to the same switch. This provides redundancy. For more information on supported configurations, refer to the *Sun StorEdge network FC switch-8 and switch-16 Installation and Configuration Guide*, shipped with your switch.

Host   Switch   Sun StorEdge A3500FC controller module

Host adapter

Host adapter

Controller A
FC-AL port

Controller B
FC-AL port

SCSI x 5

Fibre-optic cables

Drive tray x 5

FIGURE 1 Example: Single Host Connected to One Sun StorEdge A3500FC Controller
Module Using Switches

Sun StorEdge A5200 controller module

Host

Switches

Host adapter

Host adapter

IBA
IBB

Fiber-optic cables
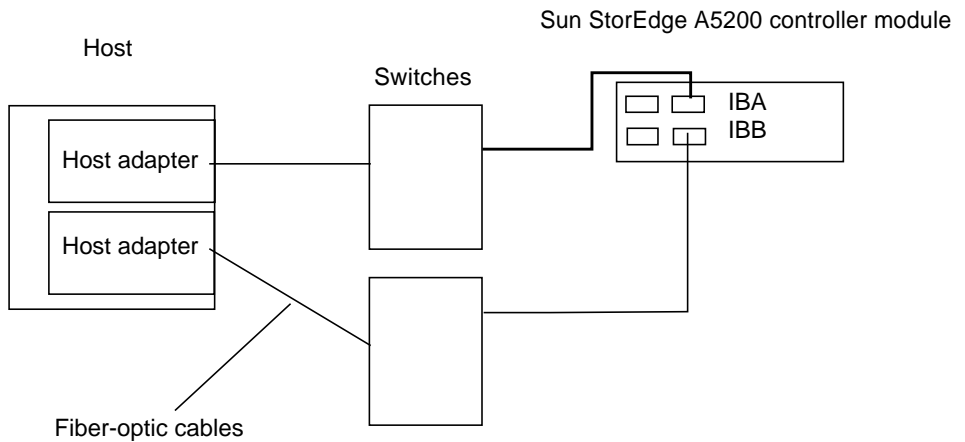
FIGURE 2 Example: Single Host Connected to One Sun StorEdge A5200 Controller
Module Using Switches
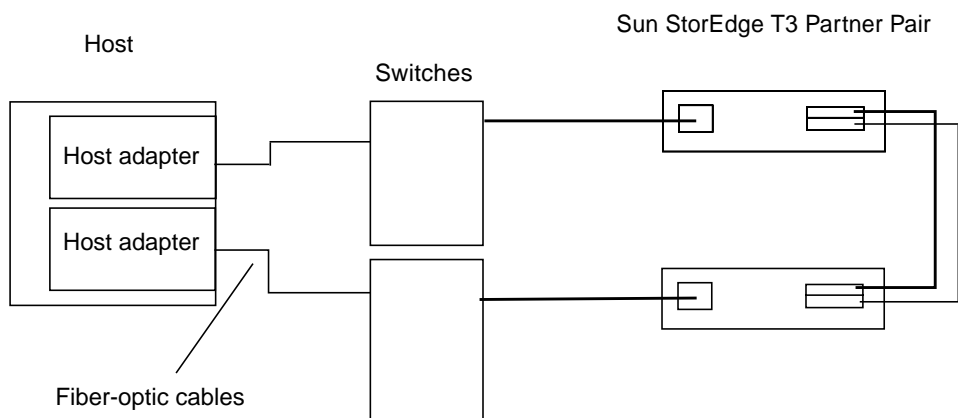
FIGURE 3 Example: Single Host Connected to One Sun StorEdge T3 Partner Pair Using Switches

Sun StorEdge A3500FC controller module 4

Controller A
FC-AL port

Controller B
FC-AL port

SCSI x 5

Host

switches

Host adapter

Host adapter

Drive tray x 5

StorEdge A3500FC controller module

Controller A
FC-AL port

Controller B
FC-AL port

SCSI x 5

Drive tray x 5

•

StorEdge A3500FC controller module

Controller A
FC-AL port

Controller B
FC-AL port

SCSI x 5

Drive tray x 5
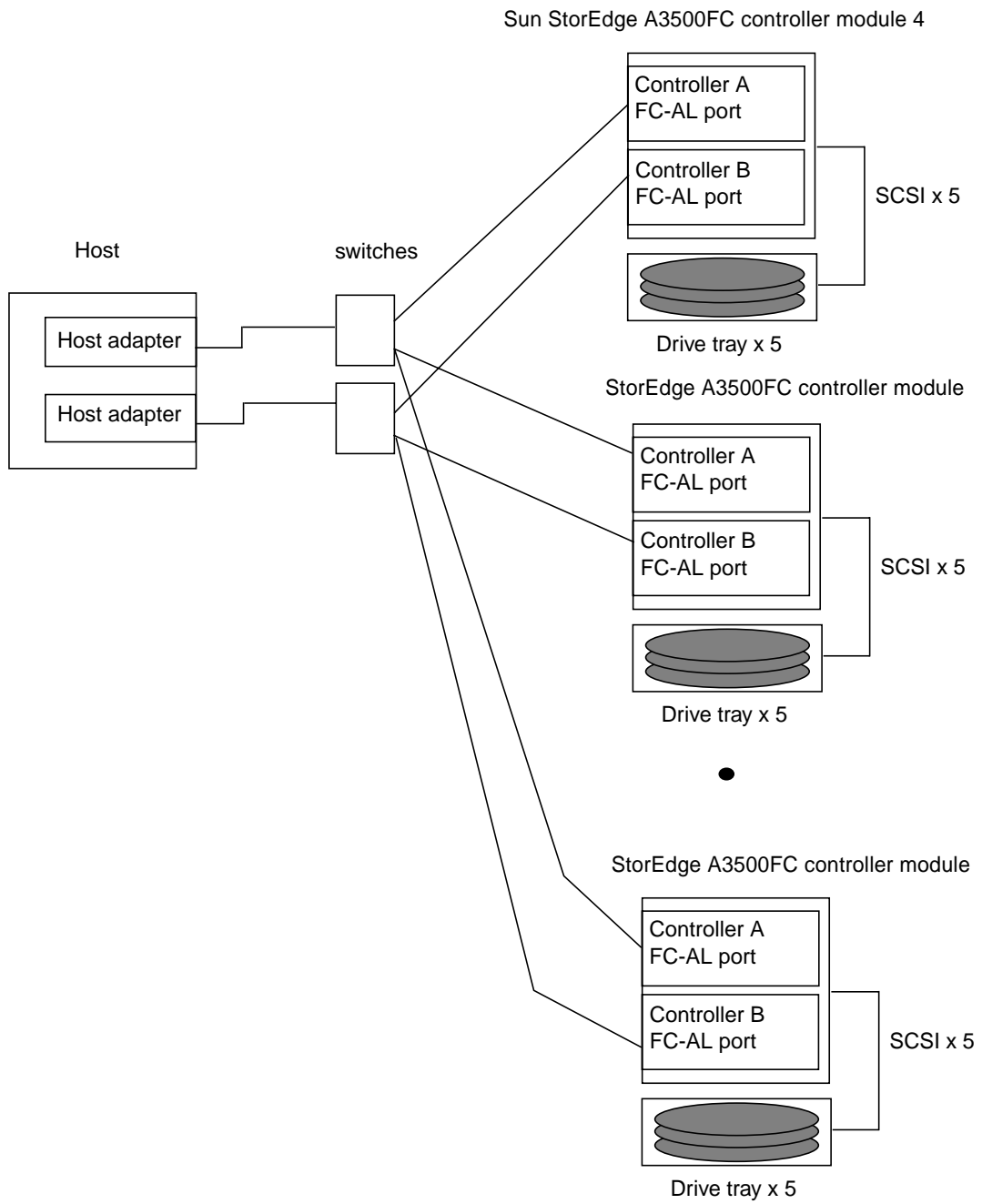
FIGURE 4   Example: Single Host to Multiple A3500FC Controller Modules Using
switches

Host   switches   IBA
                                                                IBB

Host adapter

Host adapter   IBA
                                                                IBB

                                                               IBA
                                                               IBB
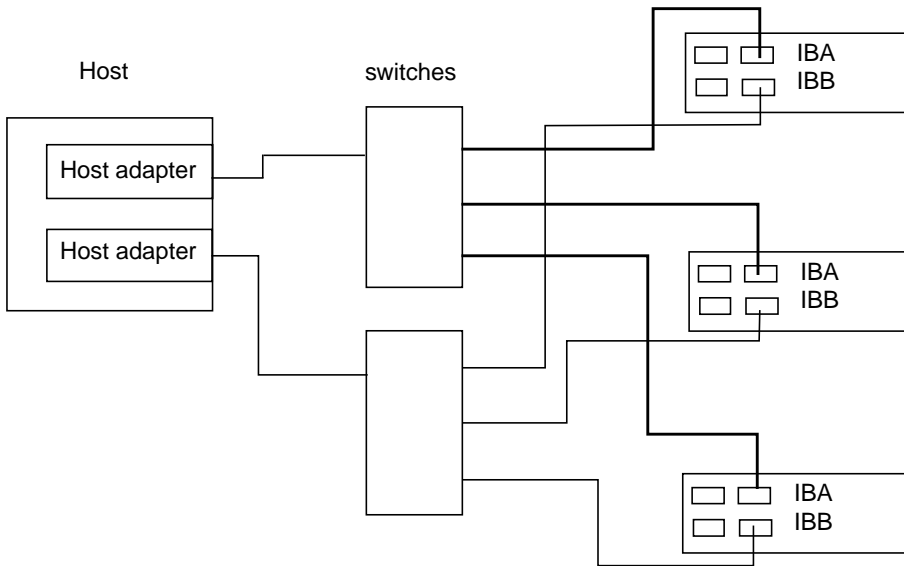
FIGURE 5   Example: Single Host to Multiple A5200 Controller Modules Using switches
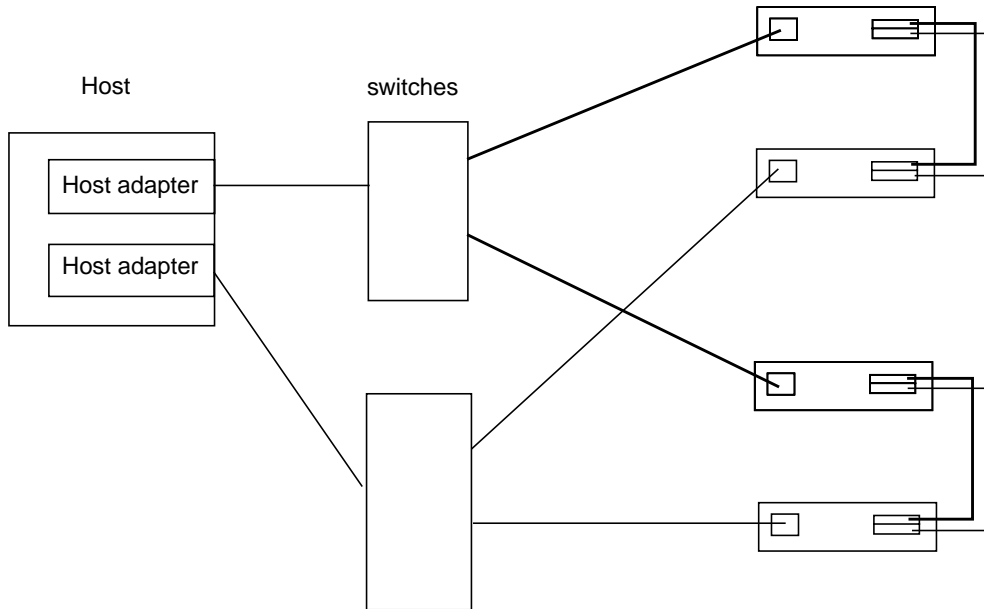
FIGURE 6   Example: Single Host to Two StorEdge T3 Partner Pairs Using switches

Multi-Host

FIGURE 7 shows an example of a multi-host configuration: two hosts connected through fiber-optic cables to two Sun StorEdge A3500FC controller modules using switches.

Sun StorEdge A3500FC controller modules -4

Host

| Host adapter |

| Host adapter |

switch

B

A

Controller A
FC-AL port

Controller B
FC-AL port

SCSI x 5

Drive tray x 5

Host

| Host adapter |

| Host adapter |

A

B

StorEdge A3500FC controller module

Controller A
FC-AL port

Controller B
FC-AL port

SCSI x 5

Drive tray x 5

●

StorEdge A3500FC controller module

Controller A
FC-AL port

Controller B
FC-AL port

SCSI x 5

Drive tray x 5
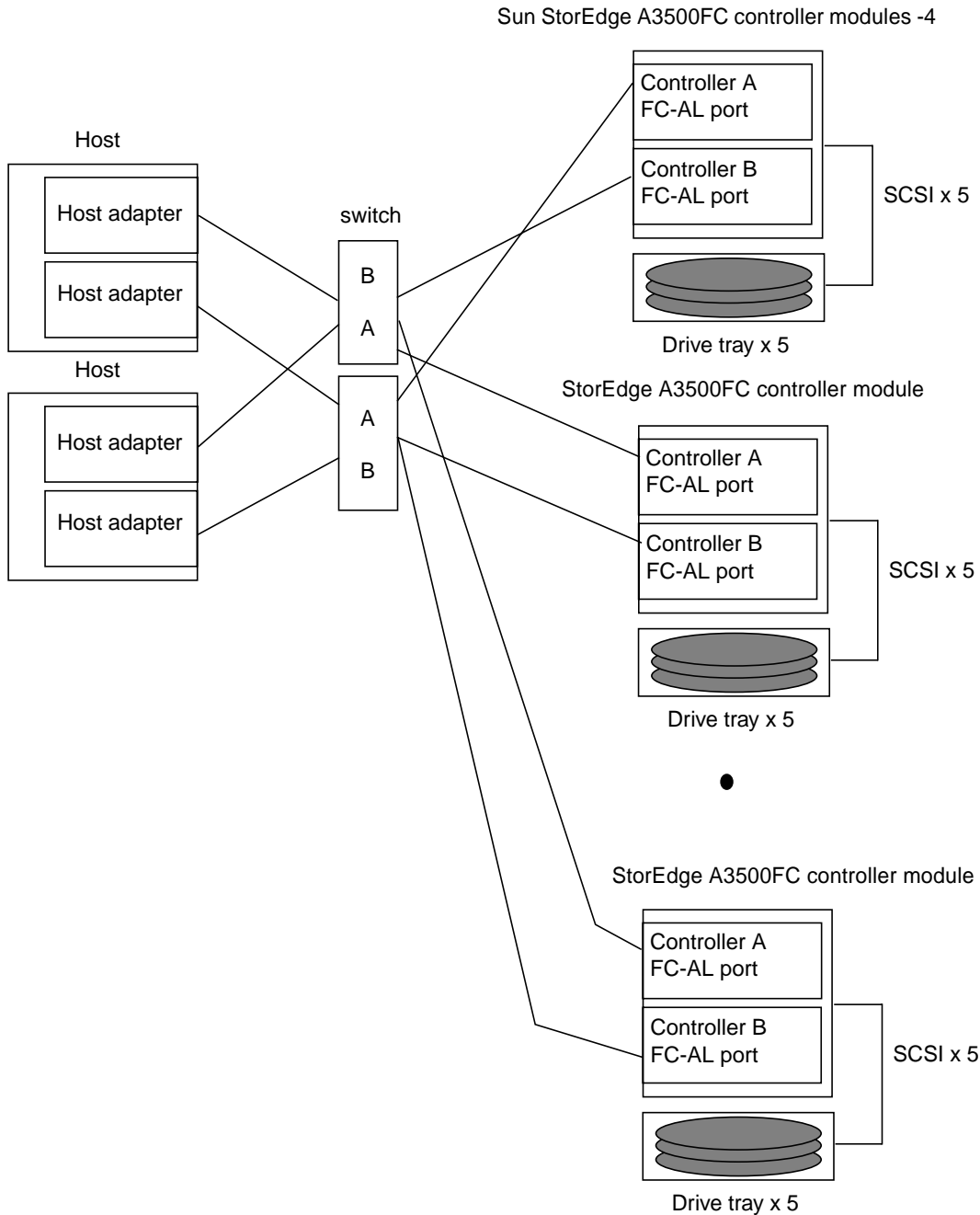
FIGURE 7   Two Hosts Connected to Up to Four A3500FC Controller Modules Using switches

Host

Host adapter

Host adapter

switches

IBA
IBB

Host

Host adapter

Host adapter

IBA
IBB

IBA
IBB
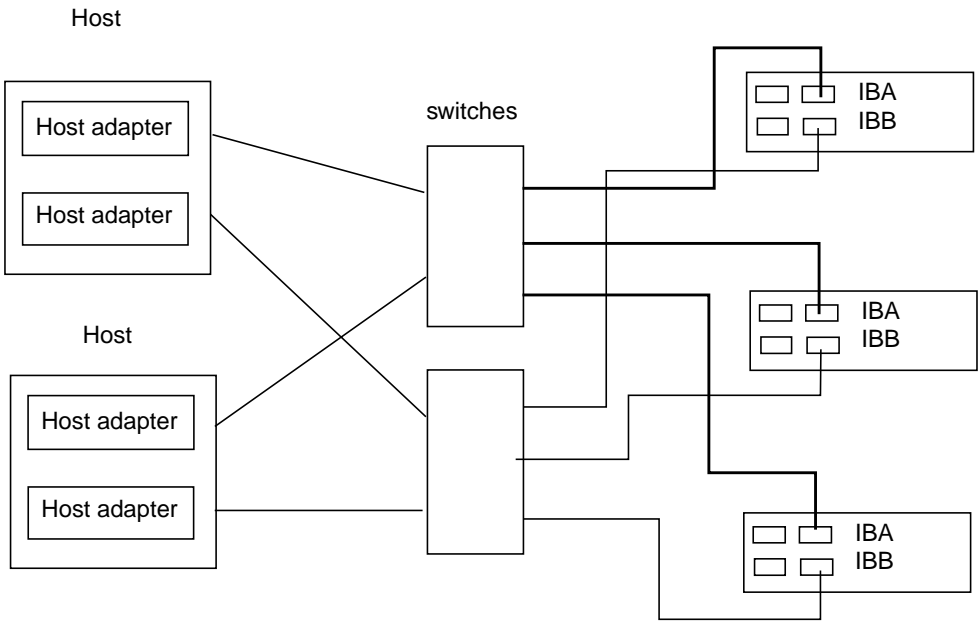
FIGURE 8   Example: Two Hosts Connected to Three StorEdge A5200 Controller Modules
Using Switches

Sun StorEdge T3 Partner Pairs - 4
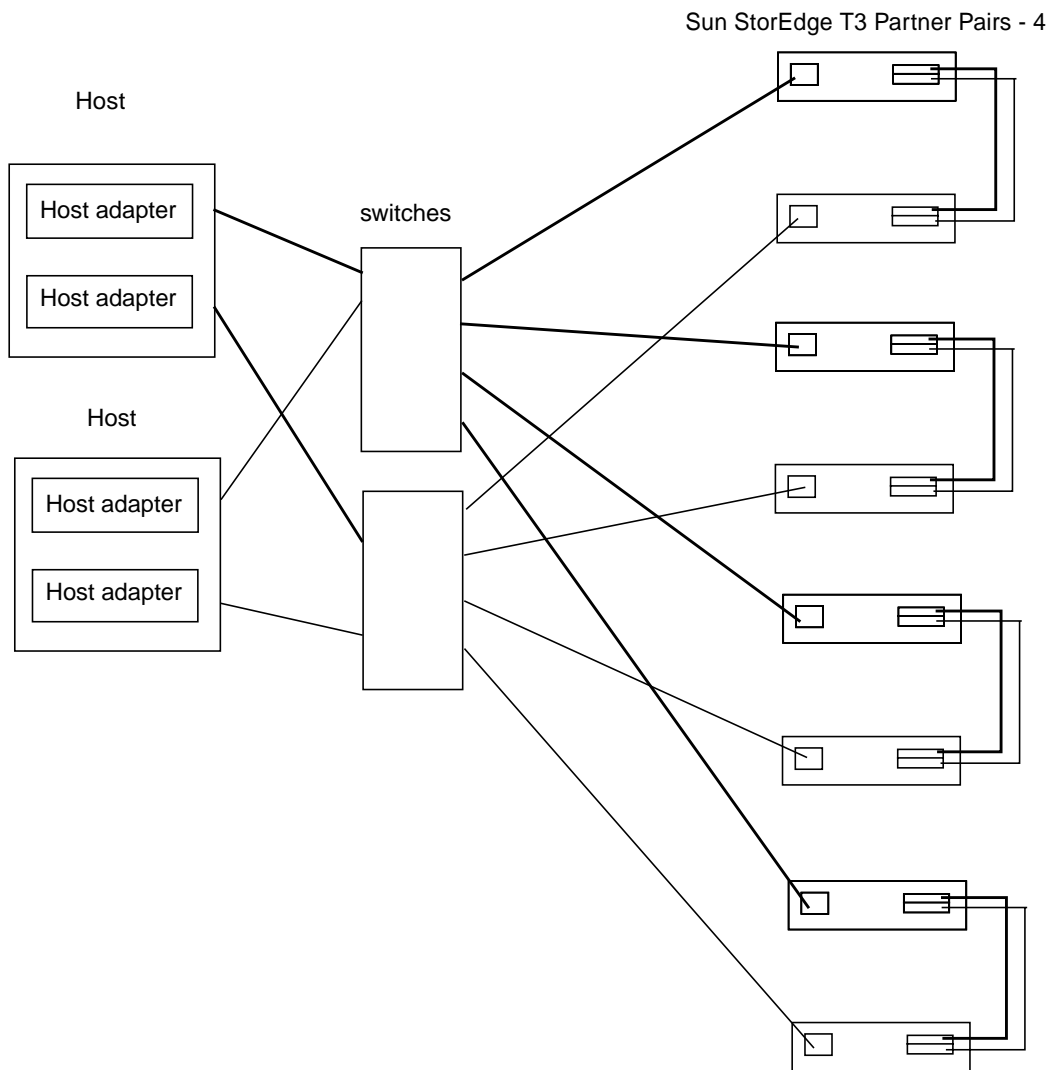
Host

Host

switches

FIGURE 9   Example: Two Hosts Connected to Four StorEdge T3 Partner Pairs Using Switches

Zoning

You can configure maximum of four zones, with a maximum of two ports per zone, for the 8-port switch and maximum of eight zones, with maximum two ports per zone, for the 16-port switch

In both the 8-port and 16-port switches, you can configure a maximum of four Sun StorEdge A3500FC arrays per zone, or three Sun StorEdge A5200 arrays per zone, or four Sun StorEdge T3 Disk Trays per zone.
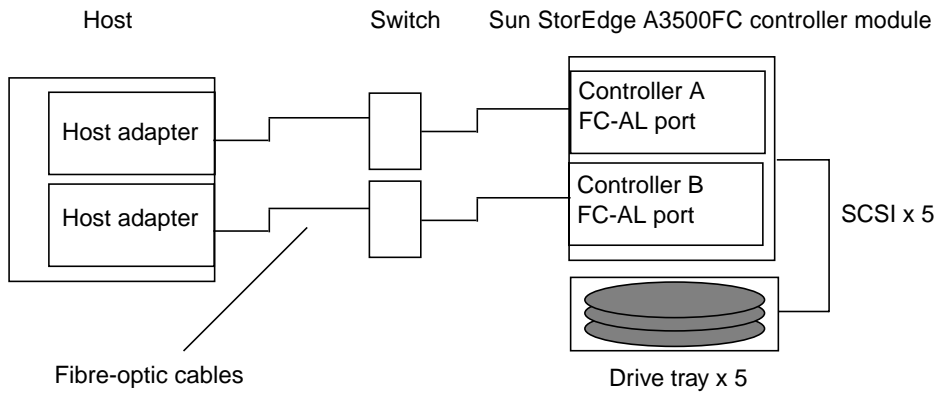
For more information on zoning, refer to the *Sun StorEdge network FC switch-8 and switch-16 Installation and Configuration Guide* and the *SANbox 8/16 Segmented Loop Switch Management User's Manual*, shipped with your system.

Software Tools

Note – Ensure that all the systems are running Solaris 8.

The tools available for troubleshooting:

Switch side

- SANSurfer
- Sun StorEdge network FC switch 2.0 GUI
- Weblog file

Host side

- RARP
- Sun Enterprises Network Array Libraries, version 11.8.0 (luxadm)
- healthck -a
- RM 6.22 GUI and cli's
- STORtools 4.0. for Sun StorEdge Network Foundation software with Sun StorEdge Fibre Network Adapter-100 host bus adapter
- SUNvts 4.0 with Sun StorEdge Network Foundation software with Sun StorEdge Fibre Network Adapter -100 host bus adapter
- rmlog.log file
- `/var/adm/messages` (hba, vm, Network Foundation, RAID Manager 6, al_pa and others)
- `format` Unix command
- Telnet

- `ping`
- `snoop`
- Sun StorEdge A3500FC's SNMP
- Sun StorEdge Component Manager Software 2.1

Hardware Tools

A loop-back cable is useful in diagnosis.

Troubleshooting Guidelines

The Sun StorEdge network FC switch-8 switch and switch-16 switches improve signal integrity, isolate failure, and provide tools for diagnosis and fault isolation. Follow basic procedures to begin troubleshooting either switch.

You can find definitions of FC-AL terms in the "Glossary" chapter of this book.

1. **Verify that the switch is powered on.**

2. **Verify and record that the** *Logged-In LED* **for any attached port is ON.**

   The Logged-In LED is the green LED on each port. Refer to the *Sun SANbox-8/16 Segmented Loop Switch Management User's Manual*, Figure 1-1.

   If the Logged-In LED is off and the device attached to the port is a host, make sure the host is powered on and booted.

   If the Logged-In LED is off and the device attached to the port is a storage unit, make sure it is powered on and is operating normally. You can verify the status of your array from the array's front LEDS and from RM6. Refer to the Sun StorEdge array manuals for more information.

3. **If the SANSurfer GUI is up, check the counters for each port.**
   - Sync losses 100ms
   - Invalid tx words recv
   - LIP total Received
   - Loss of Signal
   - Sync Loss

> **Note –** The change in the counters is what matters. A port that has high values for the counters but which has not changed for the last six months, for example, is a good, stable port. A port, however, that had a value of zero yesterday but which now has non-zero values needs further investigation.

A LIP occurring on one port in the zone propagates to all ports that have devices attached to them in that zone. Therefore, the LIP counter is incremented on all such ports.

The remaining four failures do not propagate from one port to another. A change in any of these counters indicates the possibility of a marginal hardware component.

Diagnosing and Troubleshooting the Switch

- For information about diagnosing and troubleshooting initial problems with the Switch, see "Diagnosing and Troubleshooting Physical Connections" on page 13 and refer to the Diagnostics/Troubleshooting section of the *Sun SANbox 8/16 Segmented Loop Switch User's Manual*. It explains the Power On Self Test (POST) and helps you troubleshoot the power supply, AC problems, and perform Fiber Continuity tests for open fibers in the cable network.
- The *Sun Switch Management Installer's/User's Manual* has information on managing the switch with tftp and SANSurfer.

Diagnosing and Troubleshooting Physical Connections

Power On Self Test (POST) LEDs

The Sun StorEdge network FC switch-8 and switch-16 switches perform a POST after each power cycle. You can check the health condition of the switch by monitoring the heart beat LEDs after a power cycle.

The POST errors may be fatal or non-fatal. When the switch is operating normally, the LED blinks at a 1hz rate. If a failure occurs during POST, the LED blinks in a pattern relating to the failure, pauses, and then restarts the same blinking pattern.

If the error is fatal, the switch is disabled. The heartbeat LEDs blink the error code.

If the error is non-fatal, the switch is operational, but the Logging LEDs of the corresponding portblink to show that port is down.

Refer to the *Sun Switch Management Installer's/User's Manual* for information about the LEDs. The *Sun Fibre Channel Segmented Loop Switch User's Manual* explains the different blinking patterns.

If the LED is blinking normally and you cannot access the SANSurfer GUI, check the IP address and verify that it is set correctly. Refer to the *Sun Switch Management Installer's/User's Manual* for instructions on how to check and set the IP address.

Note – The switch can be up and running in Segmented Loop mode when the SANSurfer GUI has not been started.

Internal Sun StorEdge A3500 FC Array Faults

Raid Manager 6.22 should be the beginning point for diagnosing a Sun StorEdge network FC switch-8 configuration. RM6.22 can diagnose the internals of the A3500FC array, and it causes a failover when a host data path fails.

When RM6.22 `Health_check/Recovery Guru` has detected an error condition, if it detects an error other than an unresponsive or dead controller, then the `Recovery` procedures specified by RM6.22 should be followed. (See *Sun StorEdge RAID Manager 6.22 User's Guide* for additional information.)

If the `Health_check/Recovery Guru` detects an unresponsive or dead controller, then the failure is most likely in the host data path, and additional tools need to be utilized to isolate the fault.

Guidelines for Troubleshooting the Sun StorEdge T3 Disk Tray

Several indicators monitor the status of the Sun StorEdge T3 Disk Tray.

Local Indicators

- Disk tray LEDs
  - The disk drive displays green and amber lights to indicate activity (green), and status (amber).
  - The Interconnect Card LEDs display the status of the interconnected cable.
  - The controller card has a channel activity LED and a controller status LED.
    The channel activity LED displays the status of the different ports.
    The controller status LED displays the status of the controller itself.
- The `/var/adm/messages` generated by the host channel
- Sun StorEdge Component Manager
- Telnet session, which monitors the status of the Disk Tray

Remote Indicators

- Sun StorEdge Component Manager software
- SNMP notification
- Syslog error reports

For more information about the LED display, configuration, and syslog errors, refer to the *Sun StorEdge T3 Installation, Operations and Service Manual*.

Guidelines for Troubleshooting the Sun StorEdge A5200 Array

The method you use for troubleshooting an A5200 Array depends on the problem.

Solid Hardware Fault or FC-AL Loop Hang

Use the bottom up procedure to isolate the problem.

Standard Bottom Up Checks and Tests

- Check the hardware error LED indicators.
- Check FPM error notices and information.
- Perform a manual process of elimination for Field Replaceable Unit (FRU) isolation.

- Verify the correct Solaris device files with the `luxadm` commands, `ls -l`, and the `format` utility.
- Perform STORtools loop integrity tests and use the FRU isolation tool.

Intermittant or Transient Errors, Software Driver Problems, Device File and Configuration Problems

Use the top down procedure.

Standard Top Down Methods

- Check for storage messages in `/var/adm/messages` and identify any suspect A5200s and fibre loops.
  The STORtools message summary is useful for indentifying the problem, as well.
- Check the revisions of software packages and paths and the hardware versions.
  Use STORtools to check the current status of the software and firmware.
- Verify the device file paths.
- Check related software, configuration, or startup files for recent changes.
- Analyze `core` files or `panics` (if any).
- Check the on-line SunSolve site for known bugs or problems.
- Attempt to reproduce the probem by running the STORtools loop integrity test
- Perform FRU isolation.

Data Faults Between Host and Switch
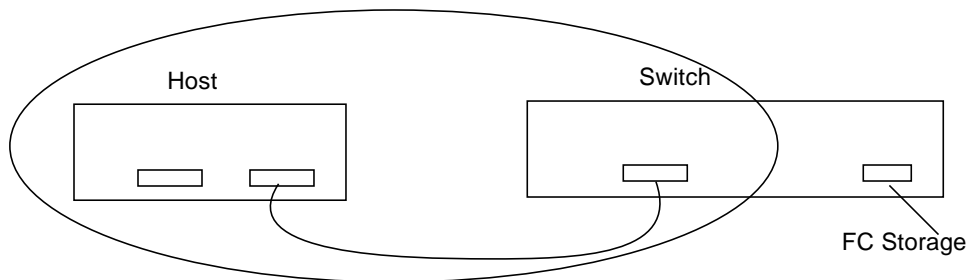
FIGURE 10 Host/Switch

These faults include any faults in the Sun StorEdge Fibre Network Adapter-100 host bus adapter, the GigaBit Interface Converter (GBIC) in the switch, and the Fibre Channel cable between the Sun StorEdge fiber network adapter-100 host bus adapter and GBIC. The `StorTools hba_test`, host-based `lbf`, and SANSurfer `Start Test` should be used to isolate faults in this path.

Note – In addition to the tools mentioned, a loopback cable is useful for isolating faults to a bad Sun StorEdge fibre network adapter-100 host bus adapter or GBIC.

To isolate a Defective Fibre Channel Cable

● **Swap the cable and run SANSurfer** `Start Test` **to see if the problem persists or has been eliminated.**

To Isolate a Defective Sun StorEdge Fibre Network Adapter-100 Host Bus Adapter

● **Execute StorTools** `hba_test` **and host-based** `lbf` **(with loopback cable installed on the Sun StorEdge fibre network adapter-100 host bus adapter).**

For additional information on StorTools, refer to the *Sun StorEdge StorTools User's Guide*, Version 4.0.

● **Start** `sunvts` **from /opt/SUNWvts/bin and select the adapter port you want to test under the HostAdapters menu.**

Pressing the start button runs the online selftest, the mailbox loopback test, the firmware checksum test, the internal 10-bit loopback test, and the internal 1-bit loopback test.

If you turn on verbose mode, the qlctest displays the firmware revision, the Adapter Chip revision, the Risc revision, the Frame Buffer revision, the Riscrom revision and the Driver revision.

If the adapter port has a loopback cable installed or is attached to storage, you may select to run the external loopback test by right-clicking on the qlctest and selecting the test parameter options.

Caution – Do not try to run other tests or operations on the adapter port while running the qlctest. The qlctest takes priority over any other activities and causes any other activities to fail.

For additional information on SunVTS, refer to the *SunVTS 4.0 User's Guide*

To Isolate a Defective GBIC

1. **Install a loopback cable at the switch and check for pass or fail.**

2. **Execute the SANSurfer** `Start Test.`

Potential Faults

The following table lists potential faults and the tools used to detect and isolate the faults. In most cases, the fault is not isolated to a specific FRU but to multiple FRUs.

TABLE 1 Faults and Tools for Detecting and Isolating the Faults

Tools	Symptoms	Possible Faults
SANSurfer GUI Host Based lbf	SANSurfer "Start test" on port connected to host fails with the "invalid tx words rcv", "Sync Loss" and "CRC" counters being incremented.	Problem between host and switch. The possible defective components are Fibre Channel cable or the GBIC installed in the switch[1] or Sun StorEdge Network Foundation software.[2]
SANSurfer GUI	SANSurfer "Start test" on port connected to storage disk array fails with the "invalid tx words rcv", "sync loss" and CRC counters being incremented.	Problem between switch and storage disk array system. The possible defective components are storage disk array controller, fibre channel or GBIC installed in switch.
SANSurfer GUI Host Based lbf	Raid Manager 6.22 Health/Recovery Guru indicates a dead or unresponsive controller.	Defective connection between host and switch. Possible defective components are Network Foundation software, fibre channel cable, or GBIC installed in the switch.
Raid Manager 6.22	In the "port display" window of the SANSurfer GUI, both the host port and the storage disk array system are reported as inactive.	Defective connection between host and switch. Possible defective components are Network Foundation software, fibre channel cable, or GBIC installed in the switch.
SANSurfer GUI	Raid Manager 6.22 Health/Recovery Guru indicates a dead or unresponsive controller.	Problem between switch and storage disk array system. Possible defective components are storage disk array controller, fibre channel cable, or GBIC installed in the switch.
Raid Manager 6.22	In the "port display" window of the SANSurfer GUI, the storage disk array system is reported as inactive.	Problem between switch and storage disk array system. Possible defective components are storage disk array controller, fibre channel cable, or GBIC installed in the switch.
Raid Manager 6.22	Raid Manager 6.22 Health Check/Recovery Guru indicates "Unresponsive drive in LUN. Follow recovery procedures specified by Raid Manager 6.22."	Drive in D1000 may have been pulled.
Raid Manager 6.22	Raid Manager 6.22 Health Check/Recovery Guru indicates "Failed/Unresponsive hot spare Drive. Follow procedures specified by Raid Manager 6.22."	Hot spare may have been pulled.

Raid Manager 6.22	Raid Manager 6.22 Health Check/Recovery Guru indicates "Failed Fan. Follow recovery procedures specified by Raid Manager 6.22."	Pulled Fan tray on D1000 unit.
Raid Manager 6.22	Raid Manager 6.22 Health Check/Recovery Guru indicates "Failed power supply. Follow procedures specified by Raid Manager 6.22." Status log says pulled AC cord on RDAC.	Pulled AC cord on D1000 units.
Raid Manager 6.22	Raid Manager 6.22 Health Check/Recovery Guru indicates "Failed power supply. Follow procedures specified by Raid Manager 6.22." Status log says pulled AC cord on RDAC module.	Pulled AC cord on RDAC module.
Raid Manager 6.22	Raid Manager 6.22 Health Check/Recovery Guru indicates "Over temperature condition and Failed Fan.	Pulled Fan on RDAC module.
Raid Manager 6.22	Raid Manager 6.22 Health Check/Recovery Guru indicates "Failed Battery. Follow procedures specified by Raid Manager 6.22."	Pulled battery on RDAC module.
Raid Manager 6.22	Raid Manager 6.22 Health Check/Recovery Guru indicates "Failed drive channel. Follow procedures specified by Raid Manager 6.22."	SCSI cable between RDAC module and D1000 unit may be disconnected.

1. For information on checkiing Fibre Channel cables or GBICs, see the *SANbox Segmented Loop Switch User's Manual*, the section on Diagnostics/Troubleshooting.

2. Please contact Sun Microsystems customer service in the event that the Possible Faults listed are not expected.

Faults Between the Sun StorEdge network FC switch-8 Switch and the Sun StorEdge A3500 FC Array

rmlog file

rmlog is the archive for Sun StorEdge A3x00 Array messages, as `/var/adm/message` is for the overall system. The direct path on a Sun system is `/usr/lib/osa/rmlog.log`.

The easiest way to view it is with the status application of RM6, `logutil`. The file is in `/etc/raid/bin/logutil`. See `logutil(1m)` for conversion to English. Refer to page 102 of the *RAID Manager 6.22 User's Guide* for a description.
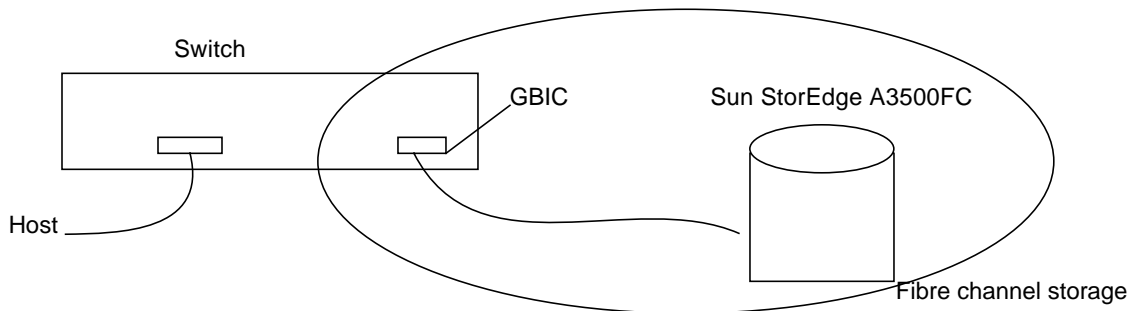
FIGURE 11   Switch/Storage

These faults include any faults in:

- the Fibre Channel controller in the Redundant Dual Active Controller (RDAC) module,
- the GBIC in the switch, and
- the fibre channel cable between the StorEdge A3500 FC array and the GBIC.

▼ To Isolate Faults

- **Use the SANSurfer** `Start Test` **to isolate faults on a port.**

  Refer to the *Sun Switch Management Installer's/User's Guide* for detailed instructions.

  A loopback cable is useful for isolating faults to GBIC.

Note – Some Fibre Channel failures are intermittent and cannot be easily duplicated, even when you run the `Start Test`.
You can achieve better results with the `Start Test` by setting the `Frame Size` to 2048 and running it with multiple patterns.

---

  a. **When a failure occurs, verify that cables and GBICs are securely installed.**

  b. **Check all the components on the port in question:**
    - GBIC
    - Cable
    - StorEdge array

Note – If it is necessary to replace components, replace the GBIC and the cable first.

▼ To Isolate a Defective Fibre Channel Cable

● **Swap the cable and run SANSurfer** `Start Test` **to see if the problem persists or has been eliminated.**

▼ To Isolate a Defective GBIC

1. **Install a loopback cable at the switch.**

2. **Execute the SANSurfer** `Start Test`.

   For additional information on SANSurfer, refer to the *Sun Switch Management Installer's/User's Manual.*

Diagnosing and Troubleshooting Tools

Set-up Procedures

From within the Switch

1. Internal counters

2. Weblog file

The Weblog File

The weblog file is critical; it records every event that takes place in the switch. It includes a time stamp.

Note – An understanding of FC-AL is important to know what the following messages mean. You can find definitions of FC-AL terms and examples in the "Glossary" chapter of this book.

CODE EXAMPLE 1   Example of Switch Weblog File

```
spawn% more Weblog.gui
04/12/2000 09:10:53 SANBox JAVA applet started
04/12/2000 09:12:56 SANBox JAVA applet started
4/12/2000 9:14:55 SANBox JAVA applet started
4/12/2000 9:15:23 iolab78 switch 100000c0dd00610b reports 78
Switch resets
4/12/2000 10:38:29 SANBox JAVA applet started
4/12/2000 10:39:04 iolab78 switch 100000c0dd00610b reports 78
Switch resets
4/12/2000 10:39:08 iolab78 switch 100000c0dd00610b port 3 reports
22102 Invalid tx words recv...(may not becurrent)
4/12/2000 10:39:08 iolab78 switch 100000c0dd00610b port 3 reports
2 LIP Total Received...(may not be current)
4/12/2000 10:39:08 iolab78 switch 100000c0dd00610b port 3 reports
2 LIP F8F7...(may not be current)
4/12/2000 10:39:08 iolab78 switch 100000c0dd00610b port 3 reports
96 AL Init Attempts...(may not be current)
4/12/2000 10:39:08 iolab78 switch 100000c0dd00610b port 3 reports
137 Loss of Signal...(may not be current)
4/12/2000 10:39:08 iolab78 switch 100000c0dd00610b port 3 reports
96 Sync Loss...(may not be current)
4/12/2000 10:39:08 iolab78 switch 100000c0dd00610b port 3 reports
95 LIP during Init...(may not be current)
4/12/2000 10:39:08 iolab78 switch 100000c0dd00610b port 7 reports
1 Sync losses 100ms...(may not be current)
4/12/2000 10:39:08 iolab78 switch 100000c0dd00610b port 7 reports
70 Invalid tx words recv...(may not be current)
4/12/2000 10:39:08 iolab78 switch 100000c0dd00610b port 7 reports
2 LIP Total Received...(may not be current)
4/12/2000 10:39:08 iolab78 switch 100000c0dd00610b port 7 reports
1 LIP F7F7...(may not be current)
4/12/2000 10:39:08 iolab78 switch 100000c0dd00610b port 7 reports
1 LIP F8F7...(may not be current)
4/12/2000 10:39:08 iolab78 switch 100000c0dd00610b port 7 reports
1 LOF Timeouts...(may not be current
```

Set-Up

Note – Any configuration.

1. **After you have set up and configured your Sun StorEdge network FC switch-8 or switch-16 hardware, bring up** `SANSurfer`.

   See the "Switch Activation" chapter of the *Sun StorEdge Sun StorEdge network FC switch-8 and switch-16 Installation and Configuration Guide* for details on bringing up the SANSurfer GUI.

2. **After you have logged in, zero out the counters and clear the messages from the messages window.**

3. **Take a snap shot of the counters and save it to a file.**

   This will allow you to go back later and compare what the initial counters show versus anything that have been incremented.

Note – Any event that takes place in the switch gets logged to the switch's messages file: `Weblog`. This file is critical because it records every event that takes place in the switch. It includes a time stamp.

Troubleshooting the Sun StorEdge Network Foundation Software

Common Installation and Configuration Problems

■ Sun StorEdge Network Foundation Software drivers will not load if there is no Sun StorEdge Network Adapter in the system.

Common User Errors

■ Misconnecting Fibre Channel cables.

■ Device ID (`hard address`) conflicts between devices or enclosures on the same loop. Each must have a unique Device ID. Refer to the documentation that came with your array for information.

Troubleshooting

Recommended Utilities

- `format` shows all Sun StorEdge Network Foundation Software-attached disks. For example:

```
clt30d0 <Sun-T3-0101 cyl 34145 Act2 had 64 sec 128>
/pci@1f,2000/pci@1/SUNW,qlc@4/fp@0,0/ssd@w50020f230000023d,0
```

Error Messages

Following are the most common error messages and their meanings.

TABLE 2 Common Error Messages

Error Message	Meaning
fp: [ID 517869 kern.info] NOTICE: fp(2): PLOGI to 2 failed state=Link Service Reject, reason=Logical Error	The Sun StorEdge Network Foundation Software stack is attemping to connect to a device that can't be attached to, possible another host on the same loop.
fctl [ID 999315 kern.warning] WARNING: fctl(0): AL_PA=0x2 doesn't exist in LILP map	The Sun StorEdge Network Foundation Software stack is attempting to communicate with a device not found on this loop.
fp: [ID517869 kern.warning] WARNING: fp(1): OFFLINE timeout	The link went offline and did not come online for 90 seconds
offlining HA/LUN/state)xc3/0/0x27	An attempt to take a device offline succeeded.
fp: [ID 517869 kern.info] NOTICE: fp(0) PLOGI to 84 failed state=Packet Transport error, reason=No connection	An attempt to connect to a device failed because the device or port connected to the device is offline.
SCSI transport failed: reason 'timeout':retrying command	An I/O request to a storage device timed out.
SCSI transport failed: reason 'timeout':giving up	An I/O request to a storage device timed out and the maximum number of retries has been reached.

TABLE 2   Common Error Messages

Error Message	Meaning
fp: [ID 517869 kern.info] NOTICE: fp(0): NL_Port Identifier d4 doesn't match with Hard Address ef, Will use Port WWN 22000020370f2711	The hard address does not match the AL_PA the device is using. Sun StorEdge Network Foundation Software will identify the device by WorldWide Name.
qlc: [ID686697 kern.info] NOTICE: Qlogic qlc (0) :Loop OFFLINE	The Fibre Channel loop associated with the mentioned Qlogic port went offline.
qlc: [ID686697 kern.info] NOTICE: Qlogic qlc (0) :Loop ONLINE	The Fibre Channel loop associated with the mentioned Qlogic port went online.

Fibre Channel—LIP

This appendix provides an introduction to Fibre Channel protocols. See the Glossary for definitions of the terms.

Introduction to LIP

A LIP is part of the FC-AL. When a new device is inserted into the loop, it issues a series of Loop Initialization Primitives or LIPs. This is to let other participants on the loop know of its entrance.

The LIP routine is simple. When a device is inserted into the loop or powered on, it issues a series of LIPs onto the loop. Codes associated with specific LIP primitives indicate the reason the device is requesting a loop initialization.

A LIP(F7,F7), for example, indicates that the device is entering an active loop and has no valid Arbitrated Physical Loop Address, or AL_PA.

As the LIPs propagate around the loop, all devices cease their previous activity and enter an initialization state. A temporary loop master is selected to oversee address assignment, and a series of frames are circulated around the loop to allow each participant to select a unique address.

Once address selection and identification is complete, the loop devices exit the initialization routine and resume normal operation. This process can last from a few milliseconds to a few seconds, depending on the configuration.

The Flow of the LIP Process From 10,000 Feet

1. Device is inserted and begins issuing LIPs.

2. All devices suspend current transactions.

3. Enter Loop Initialization Mode.

4. Select temporary loop master.

5. Issue Addressing frames.

6. Optional Address mapping phase.

7. Exit initialization phase.

8. Resume previous transactions, if any.

Examples:

LIP(F7, F7) - The first F7 indicates in this example that the HBA recognizes that it is on a active loop. The second F7 indicates that the device has no AL_PA

LIP(F7, AL_PS) - The first F7 indicates that it recognizes that it is on an active loop. The AL_PS is the source AL_PA of the LIP. That is, the HBA s previously assigned AL_PA. The HBA is not issuing LIPs, but to notify the loop that the topology has changed.

LIP(F8, F7) - F8 is used to indicate a loop -down state, the F7 indicates that the HBA in this case has no AL_PA.

 LIP(AL_PD, AL_PS) - Selective Reset Word on F7 and F8: In a FC-AL environment the LIP(F8) stream is the worst. A node issuing LIP(F8) s will continue streaming loop down alarms as long as it cannot recognize loop activity on its receiver.

A node issuing LIP(F7) s will trigger at most, a temporary suspension of loop operations until the loop initialization process is done.

Fibre Channel Reference Model:

API - device drivers and applications

FC-4 - Upper level protocols e.g. SCSI, IP

FC-3 - Common Services

FC-2 - Framing Protocol and Flow control

FC-1 - 8bit/10bit encoding

FC-0 - Physical: twisted pair, fiber optics, coax

Class of Service:

- Class 1 is a dedicated connection between 2 communicators with acknowledgement of frame delivery.
- Class 2 is connectionless, but provides acknowledgement.
- Class 3 is connectionless and provides no notification of delivery.

Framing Protocol:

- Data is segmented into frames for transport.
- The maximum frame size is 2,148 bytes, with 2,112 bytes of payload.
- Frames are transmitted as sequences of related frames.
- An exchange may include multiple sequences.

What makes up a FC Frame:

- SOF, a 4-byte word (class of service. . . .)
- Header, a 24-byte(D_ID, S_ID. . . .)
- Data Field, 0 to 2,112 bytes.
- CRC (cyclic redundancy check) - 4-byte
- EOF ordered set; the type of EOF is determined by the class of service.

Glossary

This glossary contains a Fibre Channel reference model, definitions for terms, and examples of error messages used in Fibre Channel Arbitrated Loop (FC-AL).

Fibre Channel Reference Model

API	Device drivers and applications.
FC-**4**	Upper level protocols, e.g. SCSI, IP.
FC -**3**	Common Services.
FC-**2**	Framing Protocol and Flow control.
FC-**1**	8bit/10bit encoding
FC-**0**	8bit/10bit encoding

Terms

AL_PA	Arbitrated Loop Physical Address; 8-bit value used to identify itself in a Arbitrated Loop in a Arbitrated Loop Cut-through, a technique that allows a routing decision to be made as soon as the destination address of the frame is received.
E_Port	An expansion port connecting two switches together.
FL_Port	On a Fibre Channel switch, a port that supports Arbitrated Loop devices.
F_Port	On a fibre channel switch, a port that supports an N_Port. A fibre channel port in a point-to-point or fabric connection.
N_Port	A fibre channel port in a point-to-point or fabric connection.

NL_Port	Node loop port; a port that supports Arbitrated Loop protocol.
G_Port	On a Fibre Channel switch, a port that supports either F_Port or E_Port
SL_Port	Segmented Loop Port. A port connected to a private loop device.
SL_Port Zone	A set of ports and their connected devices (zone) that behave as a single private loop.
Zone	A set of ports and their connected devices that have been grouped together to control information exchange.
FLOGI	Fabric Login, a process by which a node establishes a logical connection to a fabric switch.
PLOGI	A port-to-port login process by which initiators establish sessions with targets.
LISM	Loop Initialization Select Master — process by which a temporary loop master is determined.
Public Loop	An Arbitrated Loop attached to a fabric switch.
Private Loop	An Arbitrated Loop without a fabric switch
Segmented Loop	A set of ports that behave as one private loop.
LIP	Loop Initialization Primitives
LIP(F7,F7)	Example: The first F7 indicates that the HBA recognizes that it is on an active loop. The second F7 indicates that the device has no AL_PA
LIP(F7, AL_PS)	The first F7 indicates that it recognizes that it is on an active loop. The AL_PS is the source AL_PA of the LIP. That is, the HBAs previously assigned AL_PA. The HBA is not issuing LIPs, but is notifying the loop that the topology has changed.
LIP(F8, F7)	F8 is used to indicate a loop-down state; the F7 indicates that the HBA in this case has no AL_PA
LIP(AL_PD, AL_PS)	Selective Reset
D_ID	Destination ID, the destination address of the frame
S_ID	Source ID, the source address of the frame E_Port. An expansion port connecting two switches together.
Out-of-band	Transmission of management protocol outside of the Fibre Channel network, typically over ethernet.
8b/10b encoding	An ecoding scheme that converts an 8-bit byte into two possible 10-bit characters.